AT91SAM7L-STK Rev. B Starter Kit

User Guide

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Section 1

Overview

1.1 Introduction

Thank you for your purchase of the AT91SAM7L-STK starter kit. The AT91SAM7L-STK is a simple starter kit and development system for the ARM® Thumb®-based AT91SAM7L series Flash Microcontroller from Atmel Corporation. It is designed to give designers a quick start to evaluate the performance and functionality of the AT91SAM7L series microcontroller and to develop code on it for prototyping and testing of new designs.

This user guide is intended to familiarize users with the kit hardware and as an aid to develop their own applications.

1.1.1 Deliverables

Please unpack and inspect the AT91SAM7L-STK carefully and you will find the following items.

- Board
  - An AT91SAM7L-STK Board
- Power Supply
  - 2 AAA Batteries
- Cable
  - None
- CD ROM
  - SAM7L-STK CD ROM

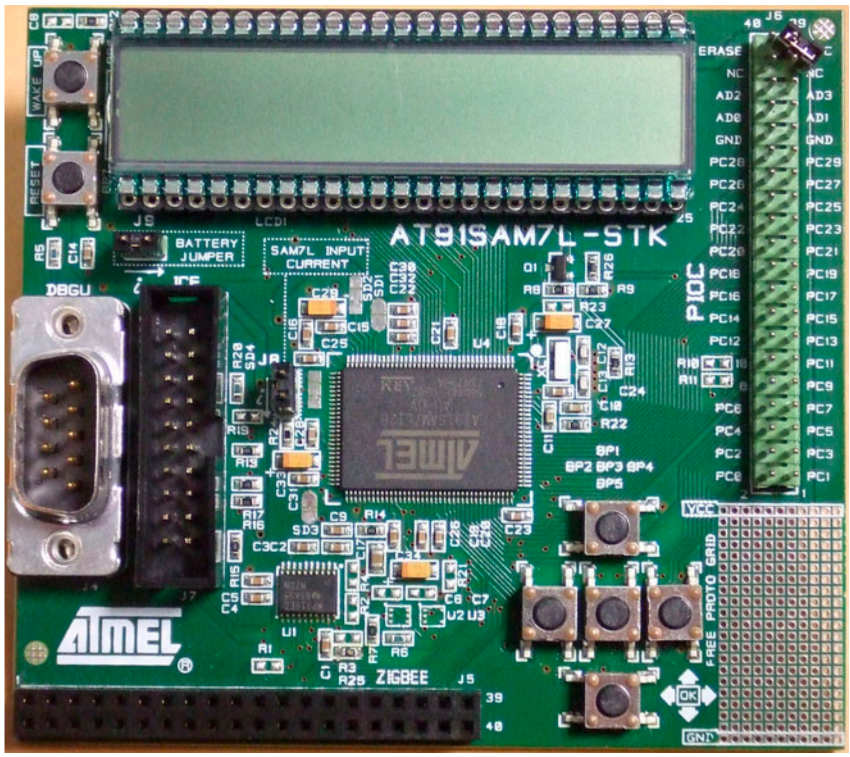
Figure 1-1. Unpacked Kit



1.1.2 Starter Kit Features

- RS232 Interface to PC for SAM-BA® Programming and Debugging
- 20-pin ICE Interface to SAM-ICE™ for Programming and Debugging
- Battery Socket for 2 AAA Size Batteries 3.0V Power Supply
- ZigBee® Interface for Atmel AT86RF230 Adaptor
- Segment LCD (10 commons by 40 segments) for Display
- 5 Push Buttons for User's Input
- User's Grid and PIO Extension Interface for Prototyping

Figure 1-2. Topview



The AT91SAM7L-STK is supported by SAM-BA version 2.7 or higher through DBGU or ICE interface for programming and debugging of the AT91SAM7L series Microcontroller. Also it is supported by many other third-party software such as: IAR, GNU and Keil™, etc through ICE interface.

1.1.3 Board Specification

Table 1-1. AT91SAM7L-STK Specification

Characteristic	Specification
Clock Speed	Up to 36 MHz
Ports	RS232
Board Supply Voltage	1.8 to 3.6V DC
Board Supply Current	18 mA typical (fully active, CPU at 36MHz)
Temperature Operating Storage	 -10° to +50° C -40° to +85° C
Relative Humidity	0 to 90%
Dimensions	94 x 84 x 32 (L x W x H mm)
RoHS	Compliant

Section 2

Setting Up the AT91SAM7L-STK Board

2.1 Electrostatic Warning

The AT91SAM7L-STK evaluation board is shipped in protective anti-static packaging. The board must not be subjected to high electrostatic potentials. A grounding strap or similar protective device should be worn when handling the board. Avoid touching the component or any other metallic element.

2.2 Requirements

In order to set up the AT91SAM7L-STK evaluation board, the following items are needed:

- The AT91SAM7L-STK evaluation board itself.
- 2 AAA batteries

2.3 Power up the Board

The AT91SAM7L-STK is shipped with an AT91SAM7L128 microcontroller mounted on board. The default jumper settings will allow the microcontroller to execute from the clock source and battery supply on the board. The microcontroller is programmed with demonstration software in its embedded Flash. Follow below steps to make it work.

- Put the 2 batteries into the battery holder, the board will go into power off mode directly.
- Push WAKE UP button under the segment LCD, the demo software will start scrolling a welcome message on the segment LCD.
- Push the RESET button, the board will go into power off mode again.

2.4 Debugging and Programming

The AT91SAM7L-STK is able to interface with SAM-BA® (v2.7 or higher) Boot Assistant software for SAM devices, and other third-party software. There is one RS232 port (DBGU) and one 20-pin ICE port on the AT91SAM7L-STK for such debugging and programming purpose. There is more detailed information about the development tools in Section 3, "Development Tools".

2.4.0.1 ICE Interface

The SAM-ICE emulator needs to be connected between the AT91SAM7L-STK ICE port (J7) and the PC USB port. You will also need to download the J-Link drivers for ARM from www.segger.com. Install the batteries, push the WAKE UP button, and then you can run PC software, such as SAM-BA, for setting and programming the device, IAR or Keil to debug your code. For detailed information, please refer to the SAM-BA user manual or that of the third-party software.

2.4.0.2 DBGU Interface

AT91SAM7L series Flash Microcontroller is able to boot from internal ROM or internal Flash memory through a general purpose NVM (GPNVM1) bit. When this bit is cleared, the MCU will boot from internal ROM to enable the SAM-BA connection through DBUG.

Connect AT91SAM7L-STK DBGU port (J4) to PC COM port through an RS232 cable. Then you can run the SAM-BA from the PC to program the internal Flash of the MCU as well as the GPNVM1 bit.

Section 3

Development Tools

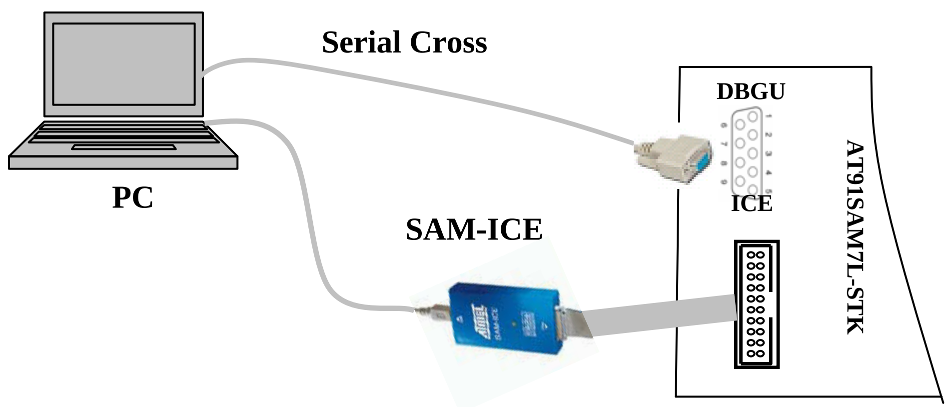
3.1 Overview

This section offers a brief introduction to the hardware and software development tools required to test and develop custom applications on the AT91SAM7L-STK. Some development tools are needed as well for programming and debugging purposes. Refer to the user manuals of these tools for more information.

3.2 Typical Development Connection

An RS232 serial cable is needed for DBGU SAM-BA communication. And a SAM-ICE interface is needed for ICE debugging and programming.

Figure 3-1. Hardware Connection for Development



3.3 Integrated Development Environment

There are many development solutions in the ARM world today, commercial or non-commercial. Generally speaking, commercial packages integrate all the tools required for embedded development and are well-supported, such as IAR® Embedded Workbench and ARM® RealView®. Contact the tool supplier for more information.

Open-source solutions such as GNU tool chain are available as well. For a step-by-step guide for setting up a working GNU-based environment targeted at Atmel's AT91SAM microcontroller family, refer to Atmel's application note "GNU-Based Software Development on AT91SAM Microcontrollers".

3.4 SAM-ICE

SAM-ICE is a JTAG emulator designed for all Atmel AT91SAM ARM7™/ARM9™ cores. DLL files to support SAM-ICE are available on the J-link ARM sub areas at www.segger.com. The J-Link software package is delivered as a ZIP file containing the setup program. After installation, SAM-ICE can be used in debugging.

SAM-ICE Features:

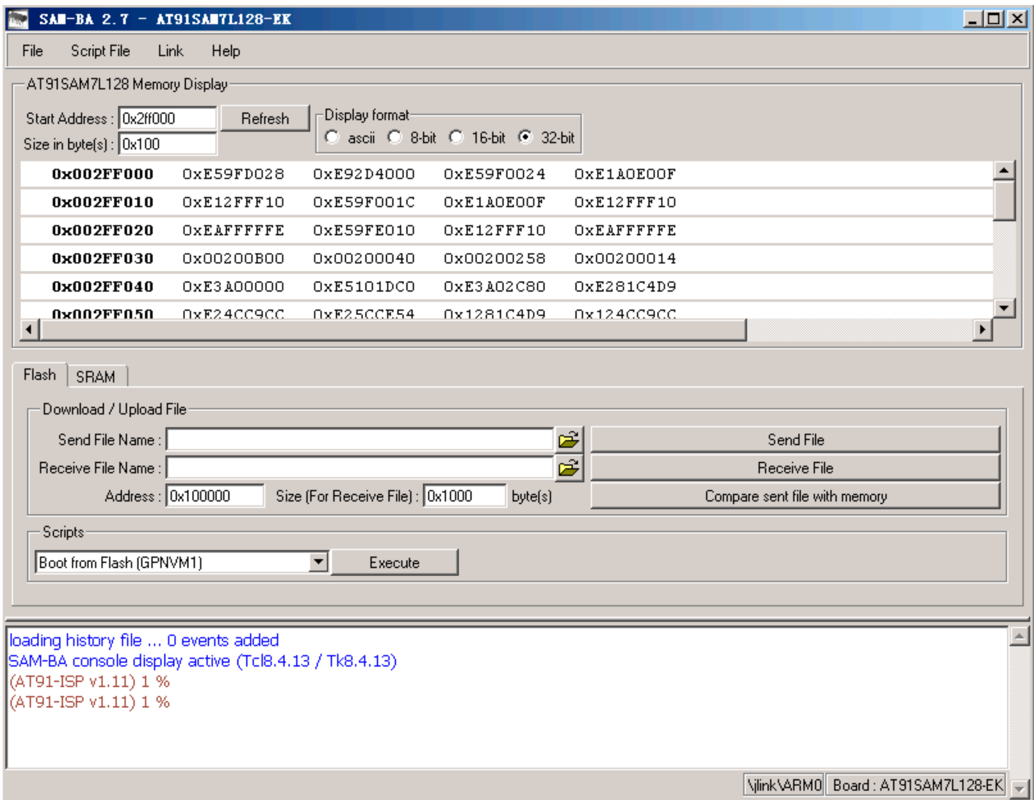
- Any Atmel AT91SAM ARM7/ARM9 core supported, including Thumb mode.
- J-Link compatible mode.
- RDI compliant .
- Download speed up to 720 KBytes/sec.
- No power supply required (powered through USB port).
- Maximum JTAG speed up to 12 MHz.
- Auto speed recognition.
- All JTAG signals can be monitored, target voltage can be measured.
- Fully plug and play compatible.
- USB and 20-pin flat cable included.
- J-Link server (connects to SAM-ICE via TCP/IP) included.
- GDB Server included.

3.5 SAM-BA®

SAM-BA (SAM Boot Assistant) is one of the tools provided in Atmel's AT91 In-System Programming (ISP) solution. It provides an easy way for programming the AT91SAM family of microcontrollers using a graphical or command-line interface. It is also possible to create powerful scripts which can then be run via the command line, enabling the automation of many tasks. Those scripts can be hand written by the programmer or generated through the graphical user interface.

After installation, SAM-BA can be used to program the AT91SAM7L-STK evaluation board via SAM-ICE or COM port connection.

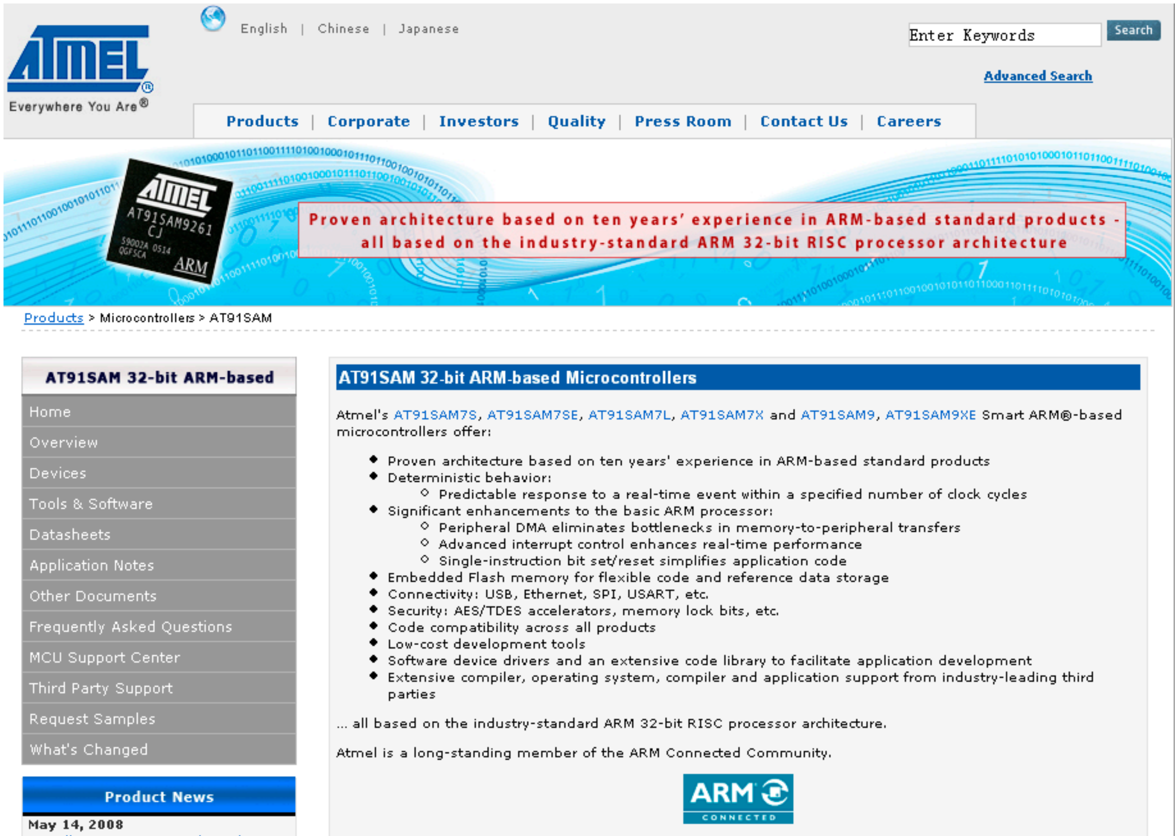
Figure 3-2. View of the SAM-BA GUI



3.6 Sample Code and Technical Support

Sample code can be downloaded and technical support is available on Atmel's website www.atmel.com.

Figure 3-3. View of the Atmel Website for AT91SAM Products



Section 4

Board Description

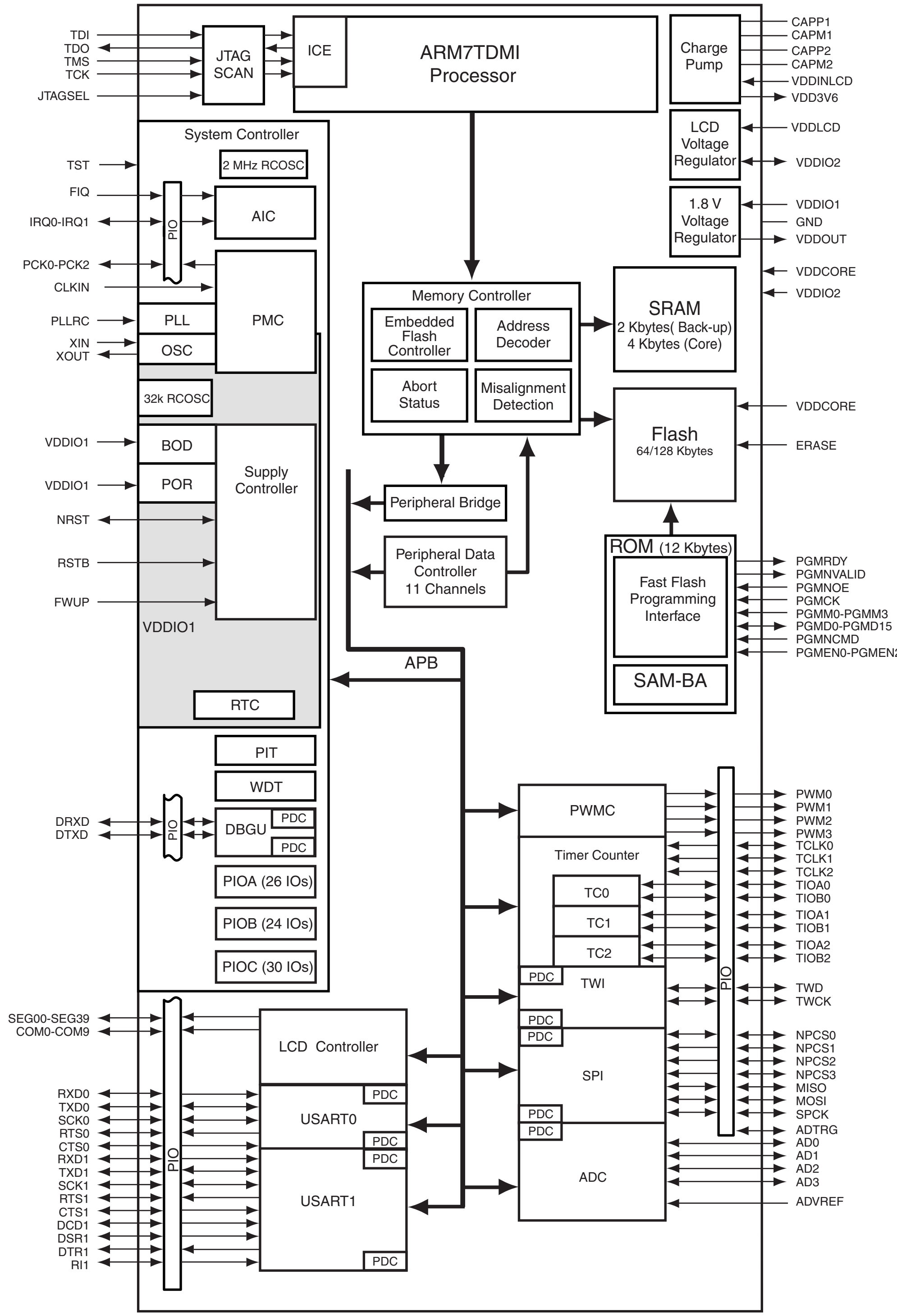
4.1 AT91SAM7L64/128 Microcontroller

- Incorporates the ARM7TDMI® ARM® Thumb® Processor
  - High-performance 32-bit RISC Architecture
  - High-density 16-bit Instruction Set
  - Leader in MIPS/Watt
  - EmbeddedICE™ In-circuit Emulation, Debug Communication Channel Support
- Internal High-speed Flash
  - 128 Kbytes (AT91SAM7L128), Organized in 512 Pages of 256 Bytes Single Plane
  - 64 Kbytes (AT91SAM7L64), Organized In 256 Pages of 256 Bytes Single Plane
  - Single Cycle Access at Up to 15 MHz in Worst Case Conditions
  - 128-bit Read Access
  - Page Programming Time: 4.6 ms, Including Page Auto Erase, Full Erase Time: 10 ms
  - 10,000 Write Cycles, 10-year Data Retention Capability, Sector Lock Capabilities, Flash Security Bit
  - Fast Flash Programming Interface for High Volume Production
- Enhanced Embedded Flash Controller (EEFC)
  - Interface of the Flash Block with the 32-bit Internal Bus
  - Increases Performance in ARM and Thumb Mode with 128-bit Wide Memory Interface
- Internal High-speed SRAM, Single-cycle Access at Maximum Speed
  - 6 kbytes
    - 2 Kbytes Directly on Main Supply that Can Be Used as Backup SRAM
    - 4 Kbytes in the Core
- Memory Controller (MC)
  - Enhanced Embedded Flash Controller, Abort Status and Misalignment Detection
- Reset Controller (RSTC)
  - Based on Brownout Reset and Low-power Factory-calibrated Brownout Detector
  - Provides External Reset Signal Shaping and Reset Source Status
- Clock Generator (CKGR)
  - Low-power 32 kHz RC Oscillator, 32 kHz On-chip Oscillator, 2 MHz Fast RC Oscillator and one PLL
- Supply Controller (SUPC)
  - Minimizes Device Power Consumption
  - Manages the Different Supplies On Chip
  - Supports Multiple Wake-up Sources
- Power Management Controller (PMC)
  - Software Power Optimization Capabilities, Including Slow Clock Mode (Down to 500 Hz) and Idle Mode
  - Three Programmable External Clock Signals
  - Handles Fast Start Up
- Advanced Interrupt Controller (AIC)
  - Individually Maskable, Eight-level Priority, Vectored Interrupt Sources
  - Two External Interrupt Sources and One Fast Interrupt Source, Spurious Interrupt Protected

- **Debug Unit (DBGU)**
  - **Two-wire UART and Support for Debug Communication Channel interrupt, Programmable ICE Access Prevention**
- **Periodic Interval Timer (PIT)**
  - **20-bit Programmable Counter plus 12-bit Interval Counter**
- **Windowed Watchdog (WDT)**
  - **12-bit Key-protected Programmable Counter**
  - **Provides Reset or Interrupt Signals to the System**
  - **Counter may be Stopped While the Processor is in Debug State or in Idle Mode**
- **Real-time Clock (RTC)**
  - **Two Hundred Year Calendar with Alarm**
  - **Runs Off the Internal RC or Crystal Oscillator**
- **Three Parallel Input/Output Controllers (PIOA, PIOB, PIOC)**
  - **Eighty Programmable I/O Lines Multiplexed with up to Two Peripheral I/Os**
  - **Input Change Interrupt Capability on Each I/O Line**
  - **Individually Programmable Open-drain, Pull-up resistor and Synchronous Output**
- **Eleven Peripheral DMA Controller (PDC) Channels**
- **One Segmented LCD Controller**
  - **Display Capacity of Forty Segments and Ten Common Terminals**
  - **Software Selectable LCD Output Voltage (Contrast)**
- **Two Universal Synchronous/Asynchronous Receiver Transmitters (USART)**
  - **Individual Baud Rate Generator, IrDA® Infrared Modulation/Demodulation**
  - **Support for ISO7816 T0/T1 Smart Card, Hardware Handshaking, RS485 Support**
  - **Manchester Encoder/Decoder**
  - **Full Modem Line Support on USART1**
- **One Master/Slave Serial Peripheral Interface (SPI)**
  - **8- to 16-bit Programmable Data Length, Four External Peripheral Chip Selects**
- **One Three-channel 16-bit Timer/Counter (TC)**
  - **Three External Clock Inputs, Two Multi-purpose I/O Pins per Channel**
  - **Double PWM Generation, Capture/Waveform Mode, Up/Down Capability**
- **One Four-channel 16-bit PWM Controller (PWMC)**
- **One Two-wire Interface (TWI)**
  - **Master, Multi-Master and Slave Mode Support, All Atmel® Two-wire EEPROMs and I^{2}C compatible Devices Supported**
  - **General Call Supported in Slave Mode**
- **One 4-channel 10-bit Analog-to-Digital Converter, Four Channels Multiplexed with Digital I/Os**
- **SAM-BA® Boot Assistant**
  - **Default Boot Program**
  - **Interface with SAM-BA Graphic User Interface**
  - **In Application Programming Function (IAP)**
- **IEEE® 1149.1 JTAG Boundary Scan on All Digital Pins**
- **I/Os, including Four High-current Drive I/O lines, Up to 4 mA Each**
- **Power Supplies**
  - **Embedded 1.8V Regulator, Drawing up to 60 mA for the Core with Programmable Output Voltage**
  - **Single Supply 1.8V - 3.6V**
  - **Zero-power Power-on Reset and Brownout Detector, Fully Programmable**
- **Fully Static Operation: Up to 36 MHz at 85°C**
- **Available in a 128-lead LQFP Green and a 144-ball LFBGA Green Package**

4.2 AT91SAM7L64/128 Block Diagram

Figure 4-1. AT91SAM7L64/128 Block Diagram



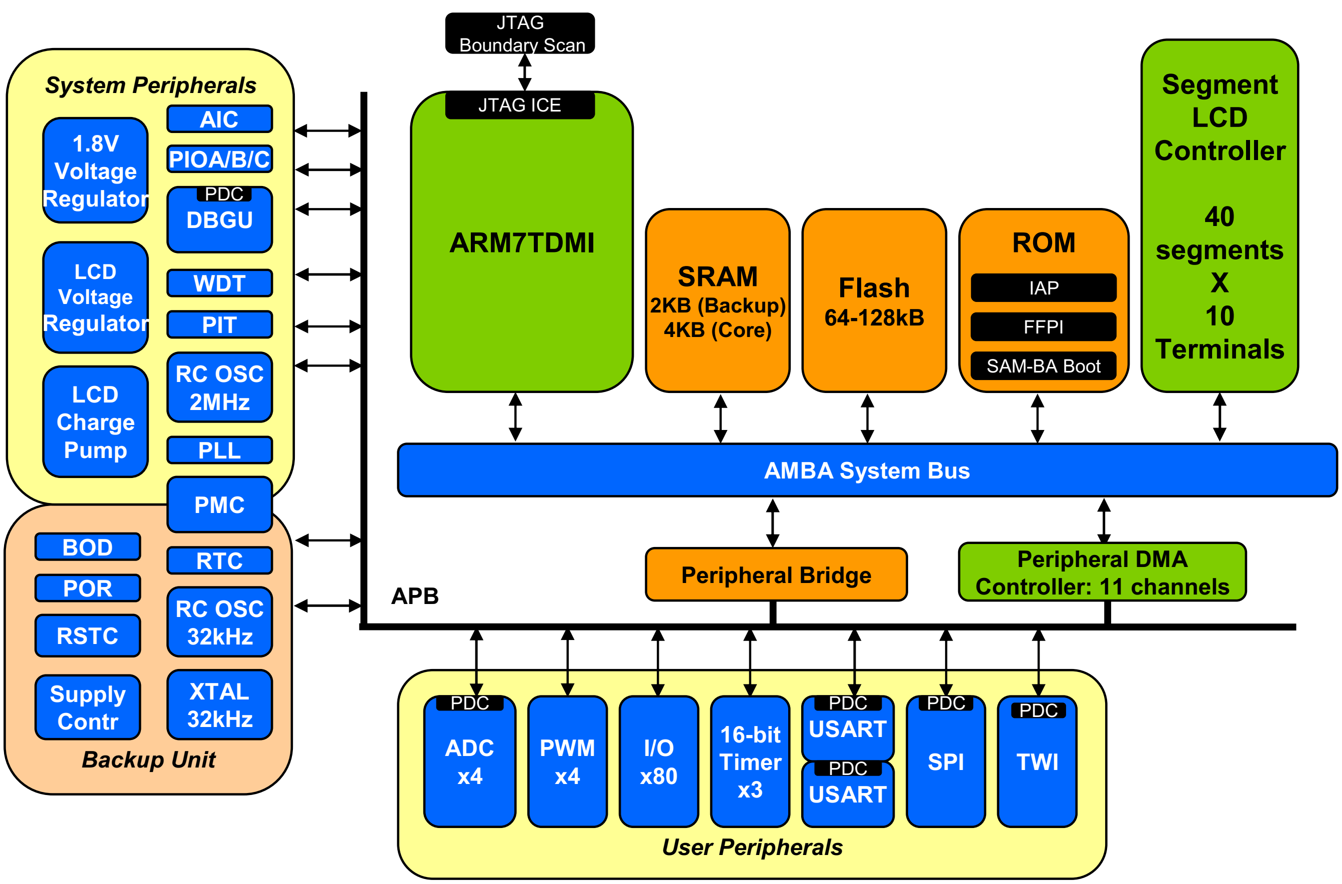
4.3 Overview

The AT91SAM7L-STK is designed to be a simple starter board for users to evaluate the performance and functionality of the AT91SAM7L-series microcontroller. Besides the basic system, the board integrates a 400-segments dot matrix LCD, segment LCD control being one of the main attributes of the AT91SAM7L, along with other low-power features.

4.4 Processor

The AT91SAM7L-STK is equipped with an AT91SAM7L128 microcontroller in a 128 lead LQFP green package. The AT91SAM7L128 is a low-power ARM7TDMI Thumb-based microcontroller, targeting battery powered systems. Various aspects contribute to this, such as: wide supply range (1.8V to 3.6V) for direct battery power, minimum leakage Power-on Reset, brownout detector, multi-mode power supply controller, adjustable PLL and more. It also provides a fully integrated 400-segments LCD controller, including drivers and charge pump for contrast control. The chip runs up to 37 MHz at 3.0V supply and 30 MHz at 1.8V supply.

Figure 4-2. AT91SAM7L Block Diagram



For more information about the AT91SAM7L microcontroller, please refer to the AT91SAM7L-series datasheet at www.atmel.com.

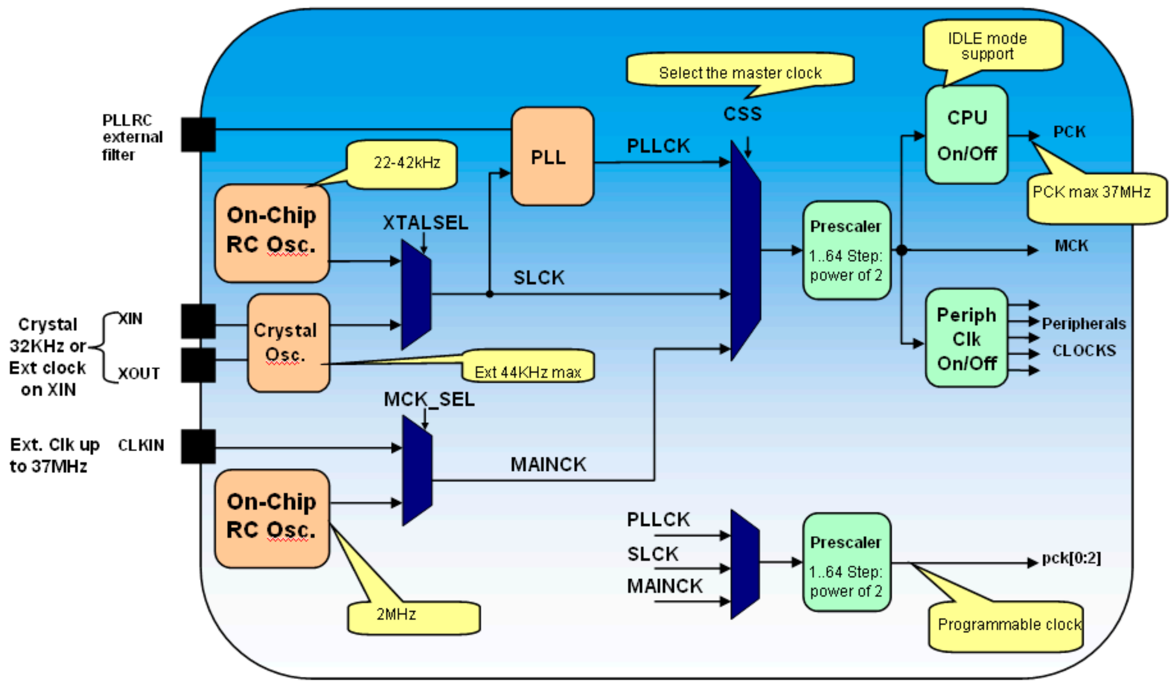
4.5 Memory

The AT91SAM7L128 embeds a total of 6 Kbytes high-speed SRAM, 128 Kbytes of high-speed internal Flash for programming and 12 Kbytes of ROM for SAM-BA support.

4.6 Clock Circuitry

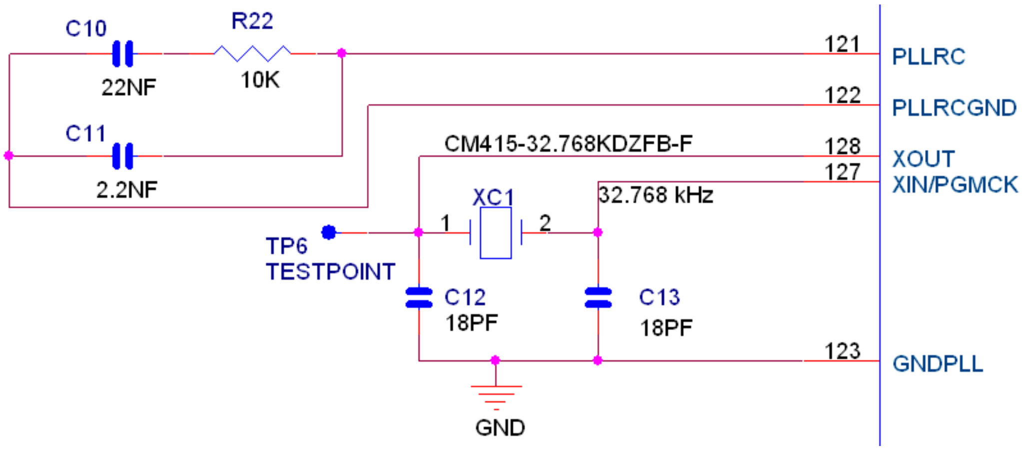
The clock generator of AT91SAM7L microcontroller is made up of one PLL, one fast RC oscillator, one slow oscillator and one 32,768 Hz crystal oscillator. To start up the system very quickly, the 2-MHz RC oscillator is automatically enabled after reset. Then it is up to the user to set and select the clock for master clock. One may opt for the 32 kHz crystal or bypass mode if accurate RTC needed.

Figure 4-3. Block Diagram of Clock Generator



On AT91SAM7L-STK board, an external 32.768 KHz crystal is connected to AT91SAM7L128 dedicated pins for external slow clock source. The external PLL filter circuit is also fitted (PLLRC).

Figure 4-4. Clock Circuit of the AT91SAM7L-STK



4.7 Reset and Wake Up Circuitry

There is one RESET button for external reset control of the AT91SAM7L128 and one WAKEUP button for waking the system up from off mode. The first time the board is powered, it will go directly into OFF mode. The WAKEUP button must be pushed to bring the chip out of OFF mode. After pushing the RESET button, the chip will go back into OFF mode.

4.7.1 Debug Considerations

Before launching a debug session, the user must ensure the core is running. The low power modes, Off mode and Backup mode, will prevent debugging the project.

Recovery Procedure:

1. The Flash must be erased: connect ERASE Jumper J6, pins 39-40.
2. Press RESET button (NRSTB pin): OFF mode is entered.
3. Exit OFF mode by pressing WAKE UP button (FWUP pin)
4. The chip enters Active mode and Flash is erased.
5. Remove ERASE Jumper J6, pins 39-40.
6. Press RESET button (NRSTB pin)
7. Exit OFF mode by pressing WAKE UP button (FWUP pin)

Note: Step 1 to 5 may be skipped if no application using a low power mode is running out of Flash.

4.8 Power Supply and Management

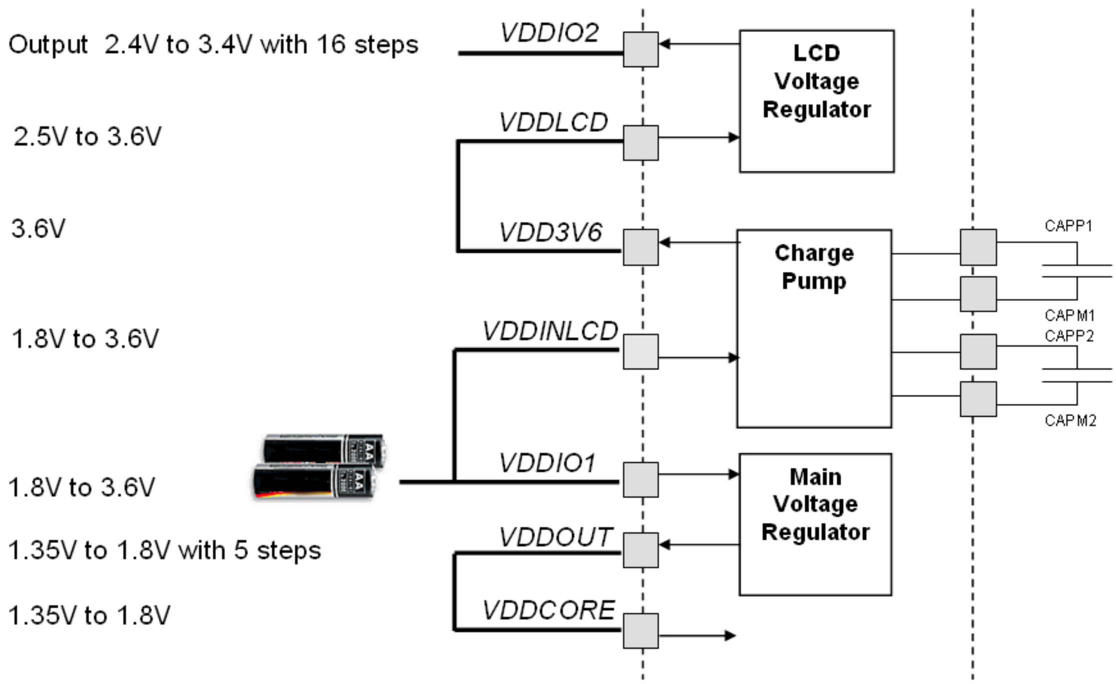
The AT91SAM7L-STK board is supplied with two AAA batteries, to be set in the battery holder (J1). Therefore the board is 3.0 Vcc powered. There are also two pads (J2 and J3) for external power supply. Users can manually solder two power wires to these pads in order to power the board from an external power supply, to be set within the AT91SAM7L128 acceptable voltage range: 1.8V to 3.6V.

Warning: If an external power source is used, the batteries must be removed.

J9 is used for power current measurement for the whole board.

The battery power is supplied to VDDIO1 and VDDINLCD. The Main Voltage Regulator inside the chip will convert the supply from VDDIO1 to VDDOUT, to be supplied to VDDCORE for ARM7TDMI core supply. The internal Charge Pump inside the chip will convert the supply from VDDINLCD to a 3.6V VDD3V6, to be supplied to the VDDLCD pin for the Segment LCD controller. J8 is used for power-current measurement on the AT91SAM7L128 power supply.

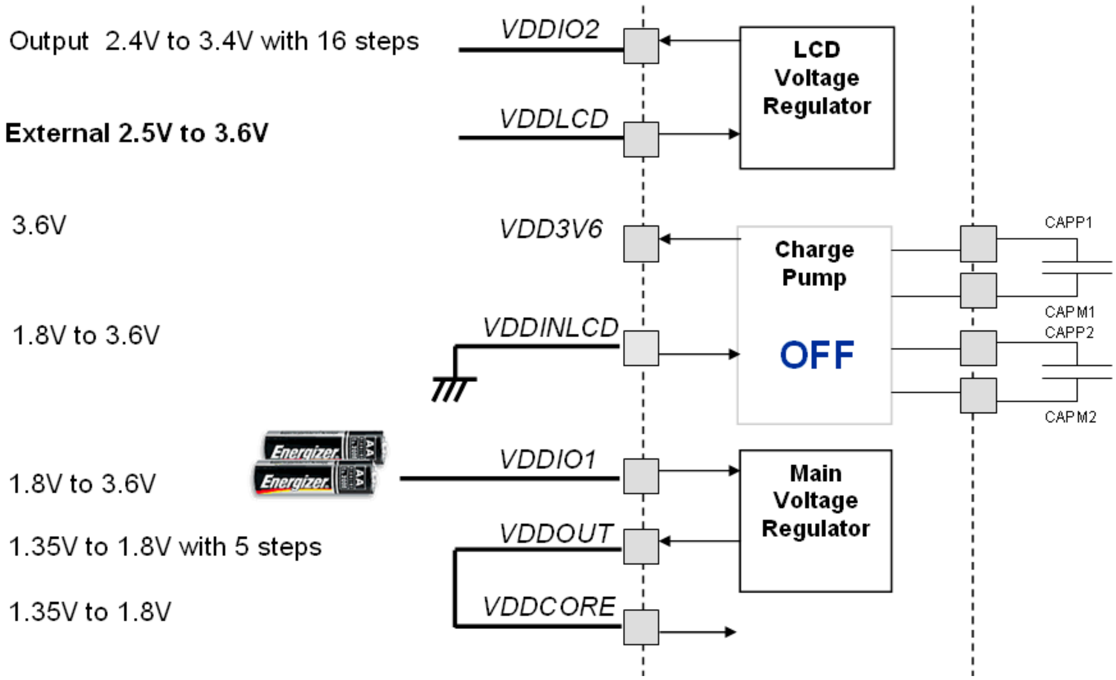
Figure 4-5. 2 AAA Batteries Single Power Supply, Board Default Setting



There is another option on the AT91SAM7L-STK. In order to provide direct battery supply to the LCD voltage regulator, first disconnect pin2 and pin3 from Solder Drops SD2 and SD4, then reconfigure SD2 and SD4 by connecting pin1 and pin2 instead.

Note: For details on AT91SA7ML power consumption, refer to the table: “Power Consumption for Low Power Modes” in the Electrical Characteristics section of the AT91SAM7L Datasheet on Atmel.com.

Figure 4-6. LCD Regulator is Externally Supplied by Battery

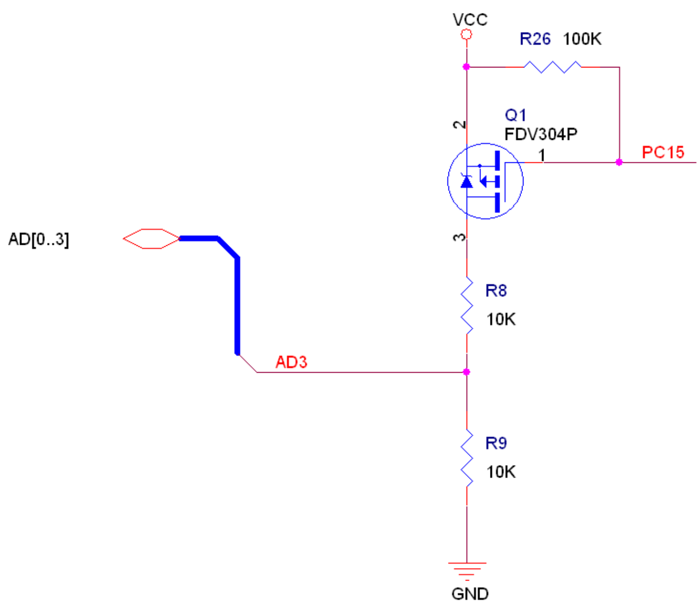


There is also a battery voltage monitor circuitry on the AT91SAM7L-STK board. The voltage is measured by AD3 of the AT91SAM7L128. This measurement bridge can be disconnected to save power consumption in OFF mode.

This is under PC15 IO control as follows:

- PC15 = 0 enables the measurement bridge and half of the battery voltage is applied to AD3.
- PC15 = 1 or high impedance disables the measurement bridge.

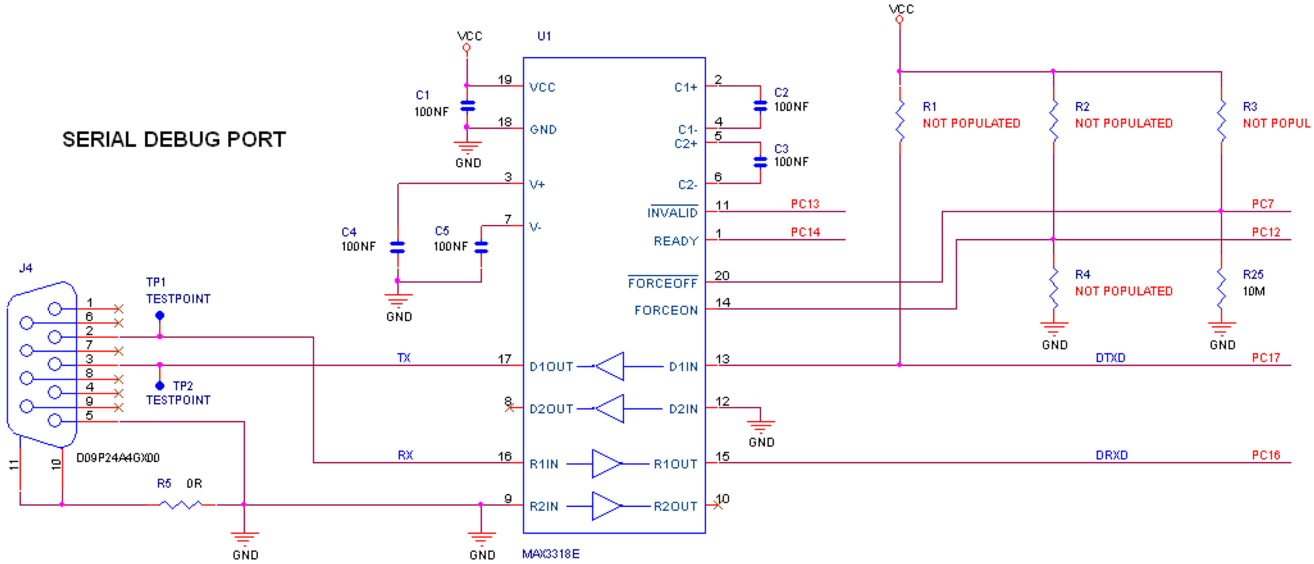
Figure 4-7. Battery Supply Monitor Circuitry



4.9 DBGU

There is one serial debug port on the AT91SAM7L-STK for PC COM port connection for SAM-BA and serial communication through TXD and RXD signals. An auto-power-down RS232 transceiver, MAX3318E, is used on this board. When the board is powered on, SAM7L is in OFF mode and the FORCEOFF pin is pull-down by default so that the MAX3318E is in power down mode. Waking-up the SAM7L will immediately turn the MAX3318E back on (FORCEON=1, /FORCEOFF=1), thanks to the default enabled pull-ups of SAM7L PIOs.

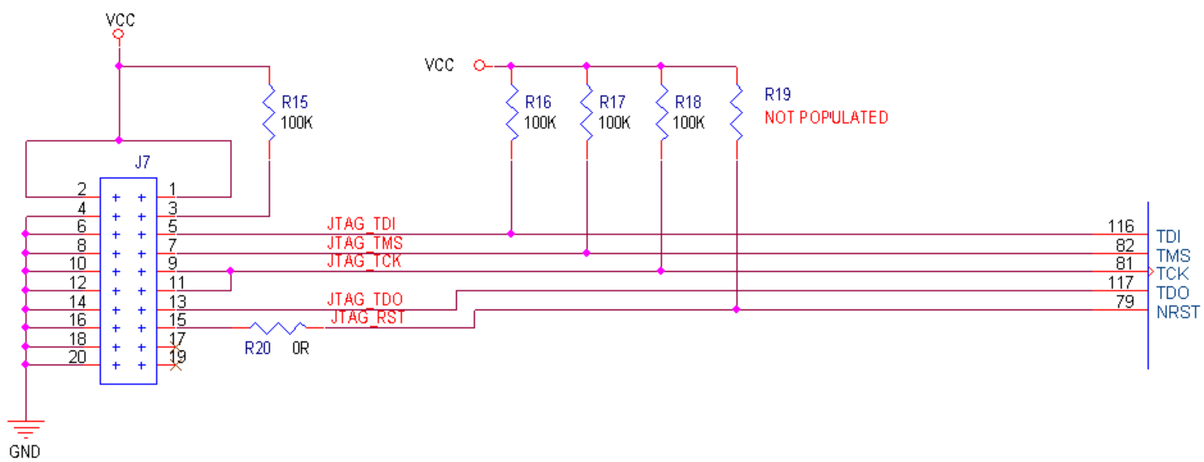
Figure 4-8. Serial Debug Interface



4.10 JTAG/ICE

There is a standard 20-pin JTAG/ICE connector on the AT91SAM7L-STK for any ARM JTAG emulator connection, such as SAM-ICE.

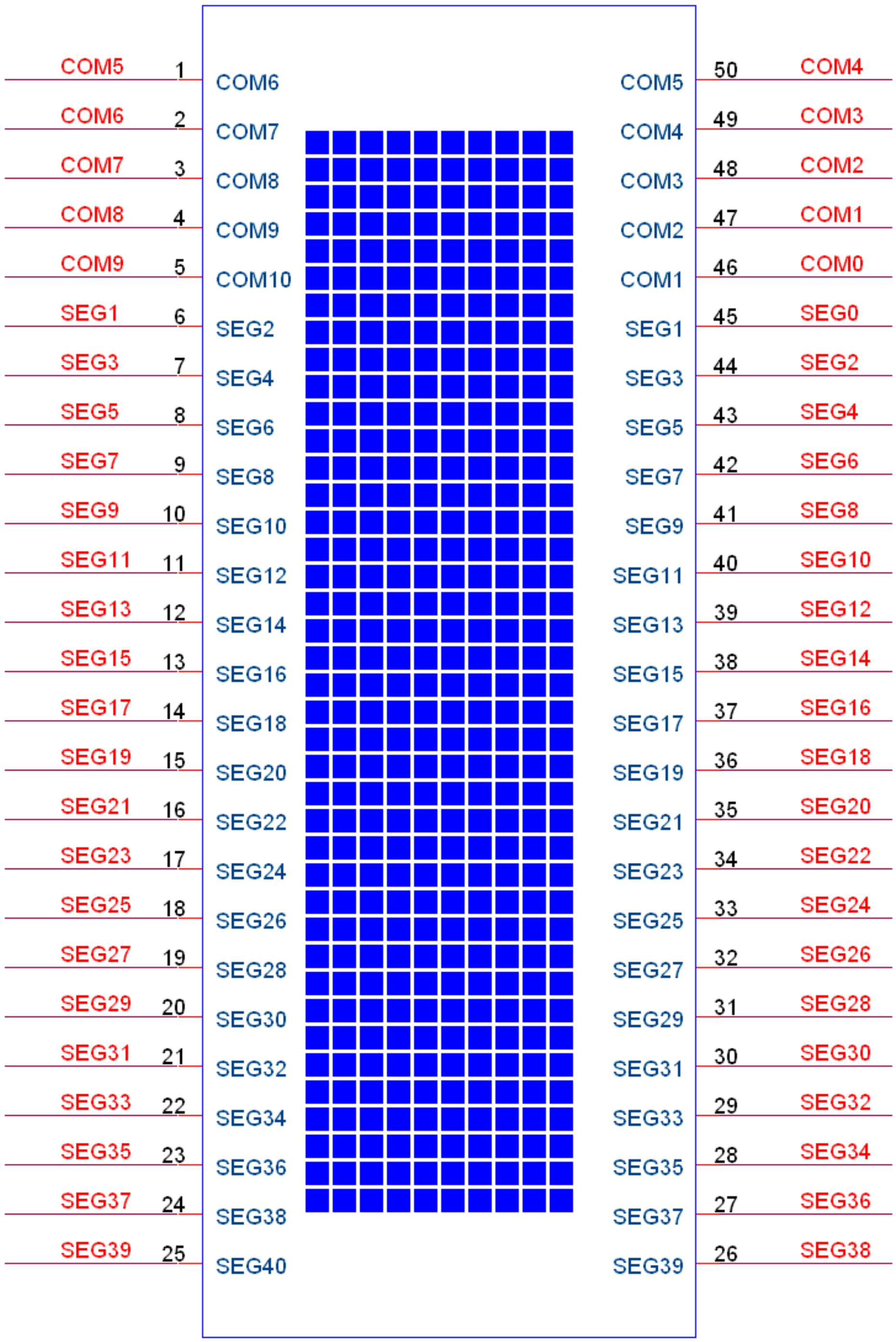
Figure 4-9. JTAG/ICE Interface



4.11 Segment LCD

The dot matrix LCD of the AT91SAM7L-STK is of type FSTN positive/reflective with 400 segments. It is controlled by the AT91SAM7L128 through 10 common signals and 40 segment signals. The contrast can be controlled by software, adjusting the LCD voltage regulator.

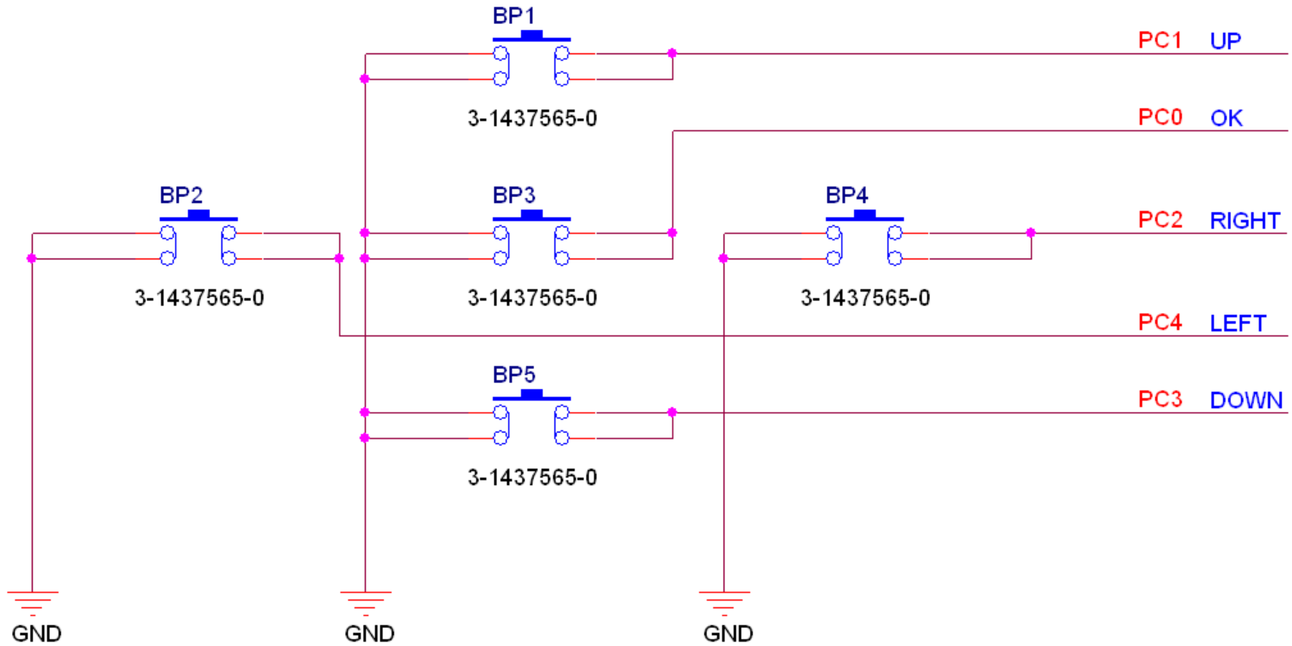
Figure 4-10. Dot Matrix Segment LCD



4.12 User Buttons

There are 5 user buttons on the AT91SAM7L-STK. The user buttons are connected to PIO lines and defined as 4-direction and ok buttons by default.

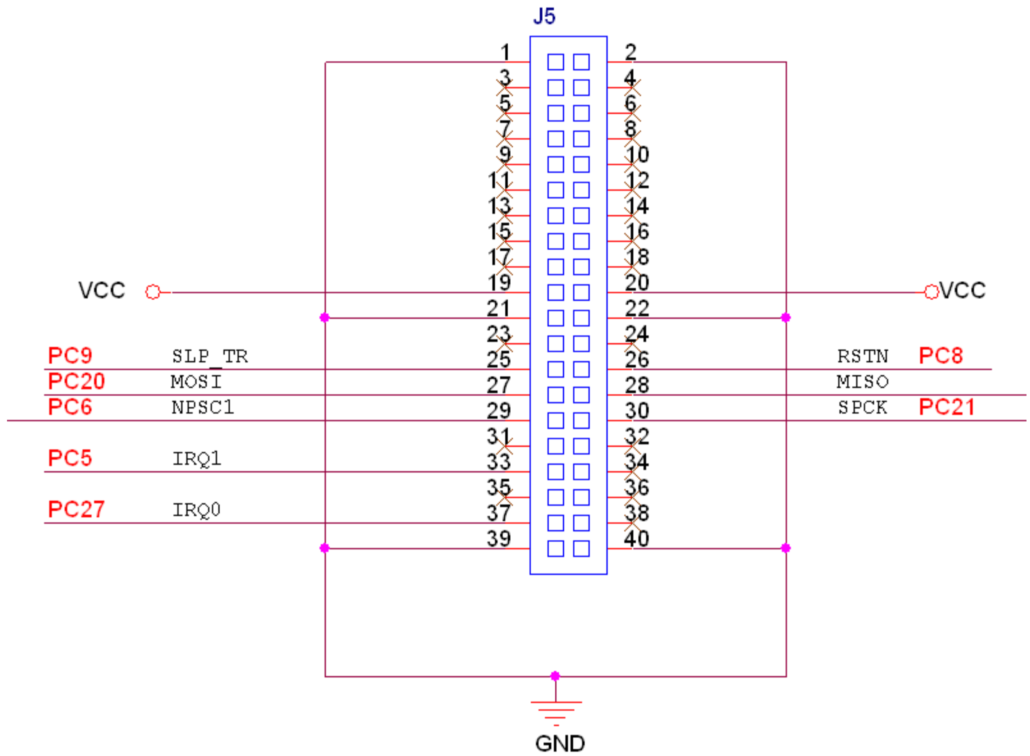
Figure 4-11. User Buttons



4.13 ZigBee

There is one ZigBee expansion interface for Atmel AT86RF230 ZigBee module. It is controlled via the SPI interface together with reset, interrupt and PIO control signals.

Figure 4-12. ZigBee Interface

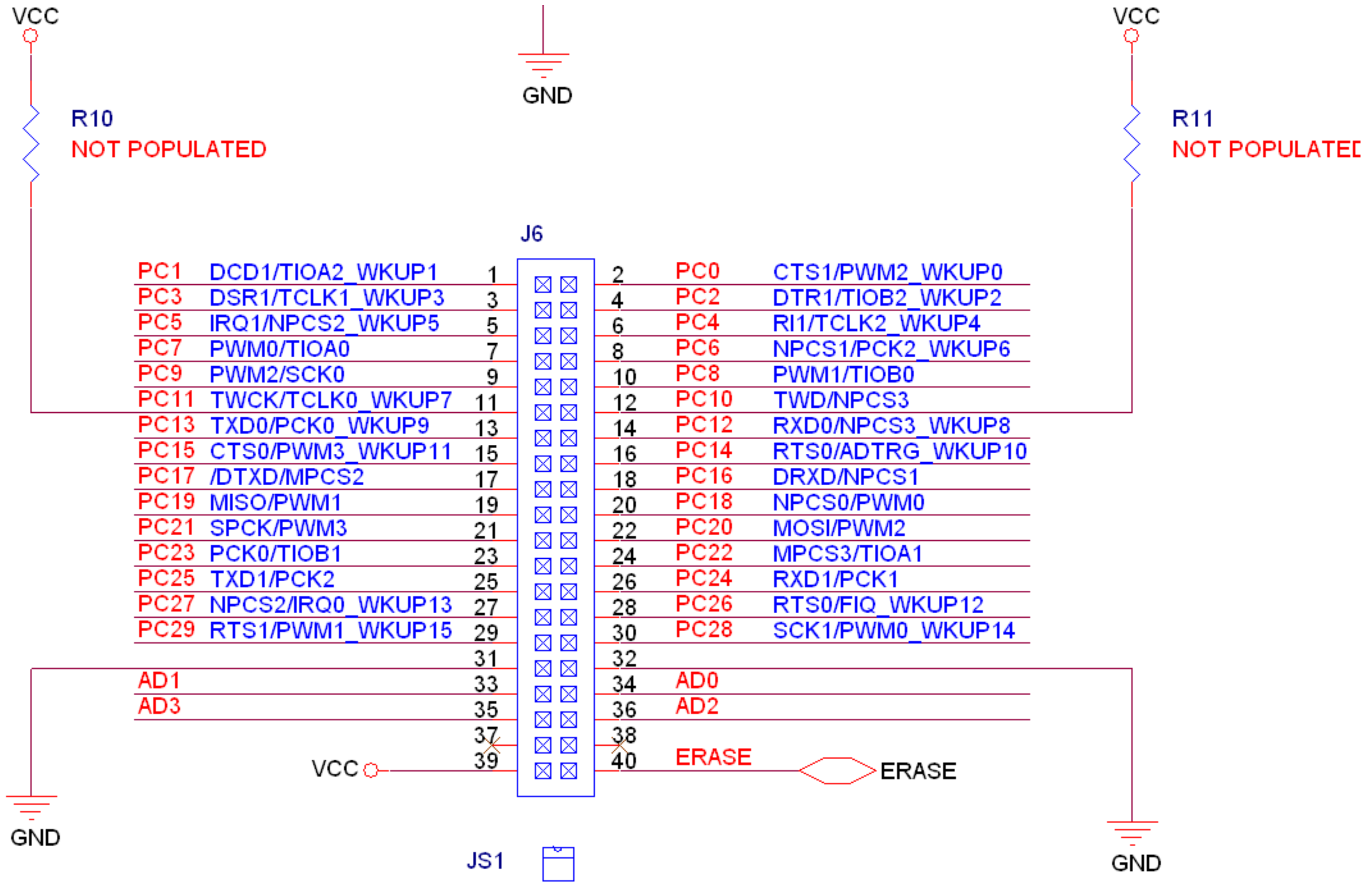


Warning: The orientation of the connected circuit must be unambiguous. If the connected board is reversed, a short-circuit occurs between VCC and GND.

4.14 PIO Expansion

The expansion connector of the AT91SAM7L-STK features the whole body of PIOC signals, ADC inputs, and ERASE pin. It enables users to expand functions such as SPI, TWI, PIO, ADC, USART, etc. With ERASE pin connected to VCC (short pin 39 and pin 40 by JS1), the internal Flash will be reinitialized upon system reset.

Figure 4-13. PIOC Expansion Connector



4.15 User Grids

The unassigned grid on the AT91SAM7L-STK is for users to implement their own small application circuit on this board.

Section 5

Configuration

The pages that follow contain detailed descriptions of PIO usage, jumpers, test points and solder drops on the AT91SAM7L-STK.

5.1 PIO Usage

The AT91SAM7L128 microcontroller features three PIOs: PIOA, PIOB and PIOC.

All Segment LCD controller signals are on PIOA and PIOB.

PIOC and some of the PIOB IOs can be used fro peripheral signals such as SPI, TWI, PWM, USART, INT, etc.

5.1.1 PIOA Usage on the AT91SAM7L-STK

Table 5-1. PIO Controller A

I/O Line	Peripheral A	Peripheral B	Peripheral Usage		Powered by
PA0			Segment LCD PANEL	COM0	VDDIO2
PA1			Segment LCD PANEL	COM1	VDDIO2
PA2			Segment LCD PANEL	COM2	VDDIO2
PA3			Segment LCD PANEL	COM3	VDDIO2
PA4			Segment LCD PANEL	COM4	VDDIO2
PA5			Segment LCD PANEL	COM5	VDDIO2
PA6			Segment LCD PANEL	SEG0	VDDIO2
PA7			Segment LCD PANEL	SEG1	VDDIO2
PA8			Segment LCD PANEL	SEG2	VDDIO2
PA9			Segment LCD PANEL	SEG3	VDDIO2
PA10			Segment LCD PANEL	SEG4	VDDIO2
PA11			Segment LCD PANEL	SEG5	VDDIO2
PA12			Segment LCD PANEL	SEG6	VDDIO2
PA13			Segment LCD PANEL	SEG7	VDDIO2
PA14			Segment LCD PANEL	SEG8	VDDIO2
PA15			Segment LCD PANEL	SEG9	VDDIO2
PA16			Segment LCD PANEL	SEG10	VDDIO2
PA17			Segment LCD PANEL	SEG11	VDDIO2
PA18			Segment LCD PANEL	SEG12	VDDIO2
PA19			Segment LCD PANEL	SEG13	VDDIO2
PA20			Segment LCD PANEL	SEG14	VDDIO2
PA21			Segment LCD PANEL	SEG15	VDDIO2
PA22			Segment LCD PANEL	SEG16	VDDIO2
PA23			Segment LCD PANEL	SEG17	VDDIO2
PA24			Segment LCD PANEL	SEG18	VDDIO2
PA25			Segment LCD PANEL	SEG19	VDDIO2

5.1.2 PIOB Usage on the AT91SAM7L-STK

Table 5-2. PIO Controller B

I/O Line	Peripheral A	Peripheral B	Peripheral Usage		Powered by
PB0			Segment LCD PANEL	SEG20	VDDIO2
PB1			Segment LCD PANEL	SEG21	VDDIO2
PB2			Segment LCD PANEL	SEG22	VDDIO2
PB3			Segment LCD PANEL	SEG23	VDDIO2
PB4			Segment LCD PANEL	SEG24	VDDIO2
PB5			Segment LCD PANEL	SEG25	VDDIO2
PB6			Segment LCD PANEL	SEG26	VDDIO2
PB7			Segment LCD PANEL	SEG27	VDDIO2
PB8			Segment LCD PANEL	SEG28	VDDIO2
PB9			Segment LCD PANEL	SEG29	VDDIO2
PB10			Segment LCD PANEL	SEG30	VDDIO2
PB11			Segment LCD PANEL	SEG31	VDDIO2
PB12	NPCS3		Segment LCD PANEL	SEG32	VDDIO2
PB13	NPCS2		Segment LCD PANEL	SEG33	VDDIO2
PB14	NPCS1		Segment LCD PANEL	SEG34	VDDIO2
PB15	RTS1		Segment LCD PANEL	SEG35	VDDIO2
PB16	RTS0		Segment LCD PANEL	SEG36	VDDIO2
PB17	DTR1		Segment LCD PANEL	SEG37	VDDIO2
PB18	PWM0		Segment LCD PANEL	SEG38	VDDIO2
PB19	PWM1		Segment LCD PANEL	SEG39	VDDIO2
PB20	PWM2		Segment LCD PANEL	COM6	VDDIO2
PB21	PWM3		Segment LCD PANEL	COM7	VDDIO2
PB22	NPCS1	PCK1	Segment LCD PANEL	COM8	VDDIO2
PB23	PCK0	NPCS3	Segment LCD PANEL	COM9	VDDIO2

5.1.3 PIOC Usage on the AT91SAM7L-STK

Table 5-3. PIO Controller C

I/O Line	Peripheral A	Peripheral B	Peripheral Usage		Powered by
PC0	CTS1	PWM2	User's Input Buttons	OK	VDDIO1
PC1	DCD1	TIOA2	User's Input Buttons	UP	VDDIO1
PC2	DTR1	TIOB2	User's Input Buttons	RIGHT	VDDIO1
PC3	DSR1	TCLK1	User's Input Buttons	DOWN	VDDIO1
PC4	RI1	TCLK2	User's Input Buttons	LEFT	VDDIO1
PC5	IRQ1	NPCS2	ZigBee	IRQ1	VDDIO1
PC6	NPCS1	PCK2	ZigBee	NPCS1	VDDIO1
PC7	PWM0	TIOA0	MAX3318E	FORCEOFF	VDDIO1
PC8	PWM1	TIOB0	ZigBee	RSIN	VDDIO1
PC9	PWM2	SCK0	ZigBee	SLP_IR	VDDIO1
PC10	TWD	NPCS3			VDDIO1
PC11	TWCK	TCLK0			VDDIO1
PC12	RXD0	NPCS3	MAX3318E	FORCEON	VDDIO1
PC13	TXD0	PCK0	MAX3318E	INVALID	VDDIO1
PC14	RTS0	ADTRG	MAX3318E	READY	VDDIO1
PC15	CTS0	PWM3	VCC/VBAT MONITOR	ENABLE	VDDIO1
PC16	DRXD	NPCS1	MAX3318E	DRXD	VDDIO1
PC17	DTXD	NPCS2	MAX3318E	DTXD	VDDIO1
PC18	NPCS0	PWM0			VDDIO1
PC19	MISO	PWM1	ZigBee	MISO	VDDIO1
PC20	MOSI	PWM2	ZigBee	MOSI	VDDIO1
PC21	SPCK	PWM3	ZigBee	SPCK	VDDIO1
PC22	NPCS3	TIOA1			VDDIO1
PC23	PCK0	TIOB1			VDDIO1
PC24	RXD1	PCK1			VDDIO1
PC25	TXD1	PCK2			VDDIO1
PC26	RTS0	FIQ			VDDIO1
PC27	NPCS2	IRQ0			VDDIO1
PC28	SCK1	PWM0			VDDIO1
PC29	RTS1	PWM1			VDDIO1

5.2 Jumpers

Jumpers are used on the AT91SAM7L-STK for internal Flash Memory reinitialization and power current measurement.

Table 5-4. Jumpers on AT91SAM7L-STK

Designation	Default Setting	Feature
J6 pins 39-40	Opened	Erase Internal Flash (1)
J8	Closed	SAM7L VCC Jumper (2)
J9	Closed	Board VCC Jumper (3)

Notes:
1. This jumper is used to erase the internal Flash and the associated NVM bits of the AT91SAM7L device.
2. This jumper is provided for enabling the AT91SAM7L128 chip power consumption measurement. By default, it is closed. To use this feature, the user has to open the strap and insert an ammeter.
3. This jumper is provided for the measurement of the whole AT91SAM7L-STK board power consumption. By default, it is closed. To use this feature, the user has to open the strap and insert an ammeter.

5.3 Test Points

Some test points have been set on the AT91SAM7L-STK PCB in order to enable the monitoring of some relevant signals.

Table 5-5. Test Points on AT91SAM7L-STK

Designation	Description
TP1	RX (RS232 levels)
TP2	TX (RS232 levels)
TP3	CLKIN
TP4	FWUP
TP5	ADREF
TP6	XOUT
TP7	NRSTB
TP8	VDDIO2
TP9	VDD3V6
TP10	VDDOUT

5.4 Solder Drops

Some solder drop selectors have been set on the AT91SAM7L-STK to enable alternate power supply schemes, such as selecting the internal charge pump to be used, or not, for the Segment LCD controller supply.

Table 5-6. Solder Drops on AT91SAM7L-STK

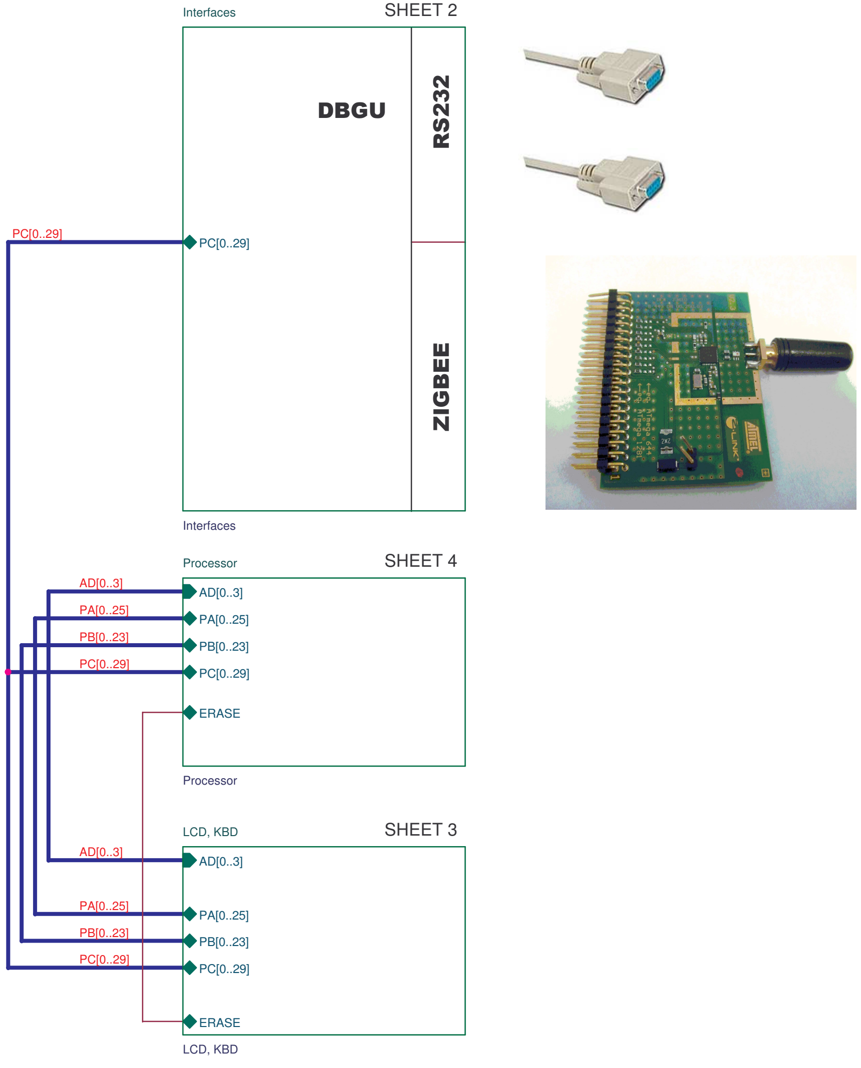
Designation	Default Setting	Feature
SD1	Opened	Disables VDDIO2 to VDDLCD connection
SD2	2-3	Selects VCC or VDD3V6 to VDDLCD
SD3	Closed	Enables VDDOUT applying to VDDCORE
SD4	2-3	Selects VDDINLCD input

Section 6

Schematics

This section contains the following schematics:

- Top Level Synoptic
- Interface
- LCD, KBD
- Processor



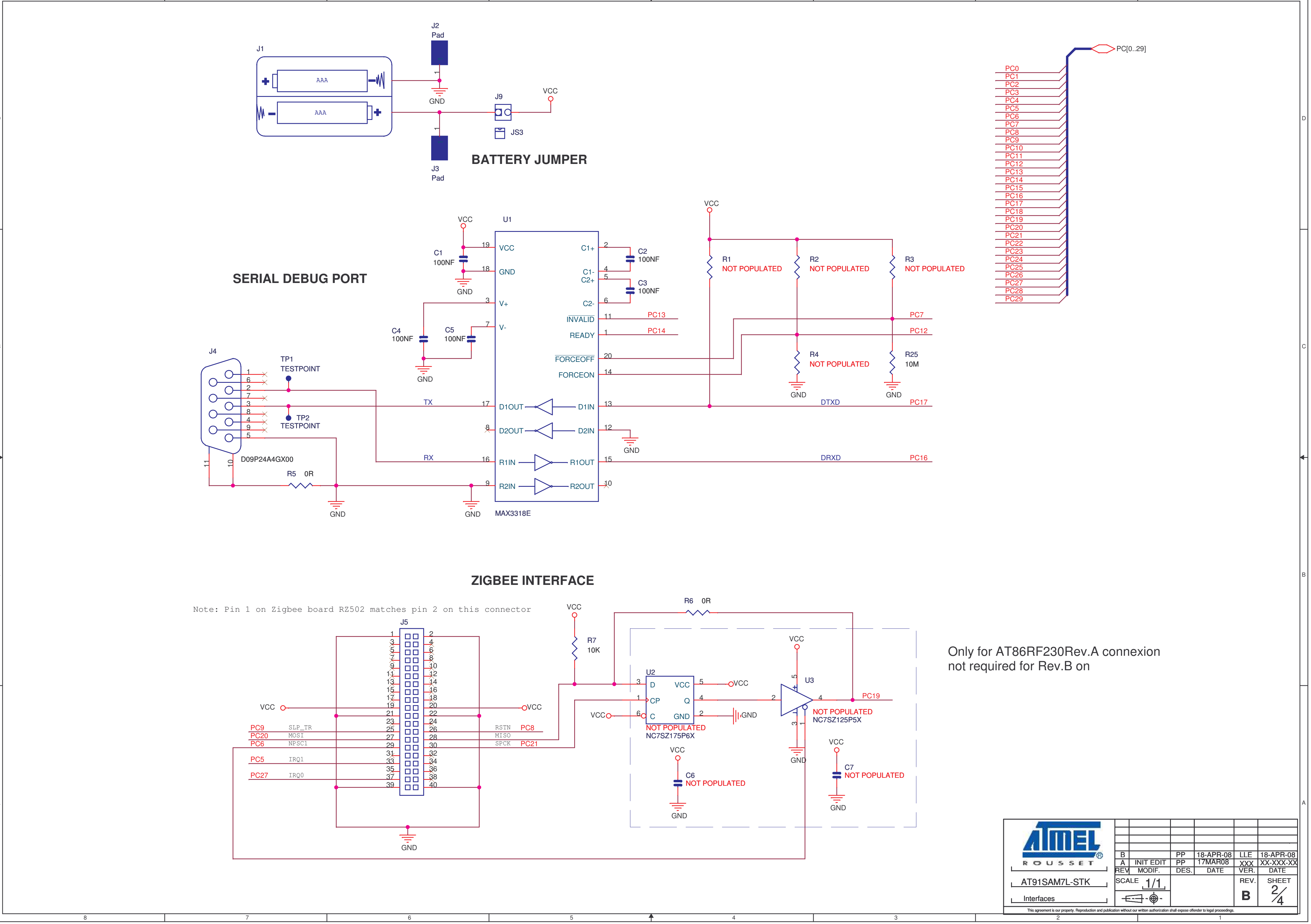
ATMEL ROUSSET

AT91SAM7L-STK

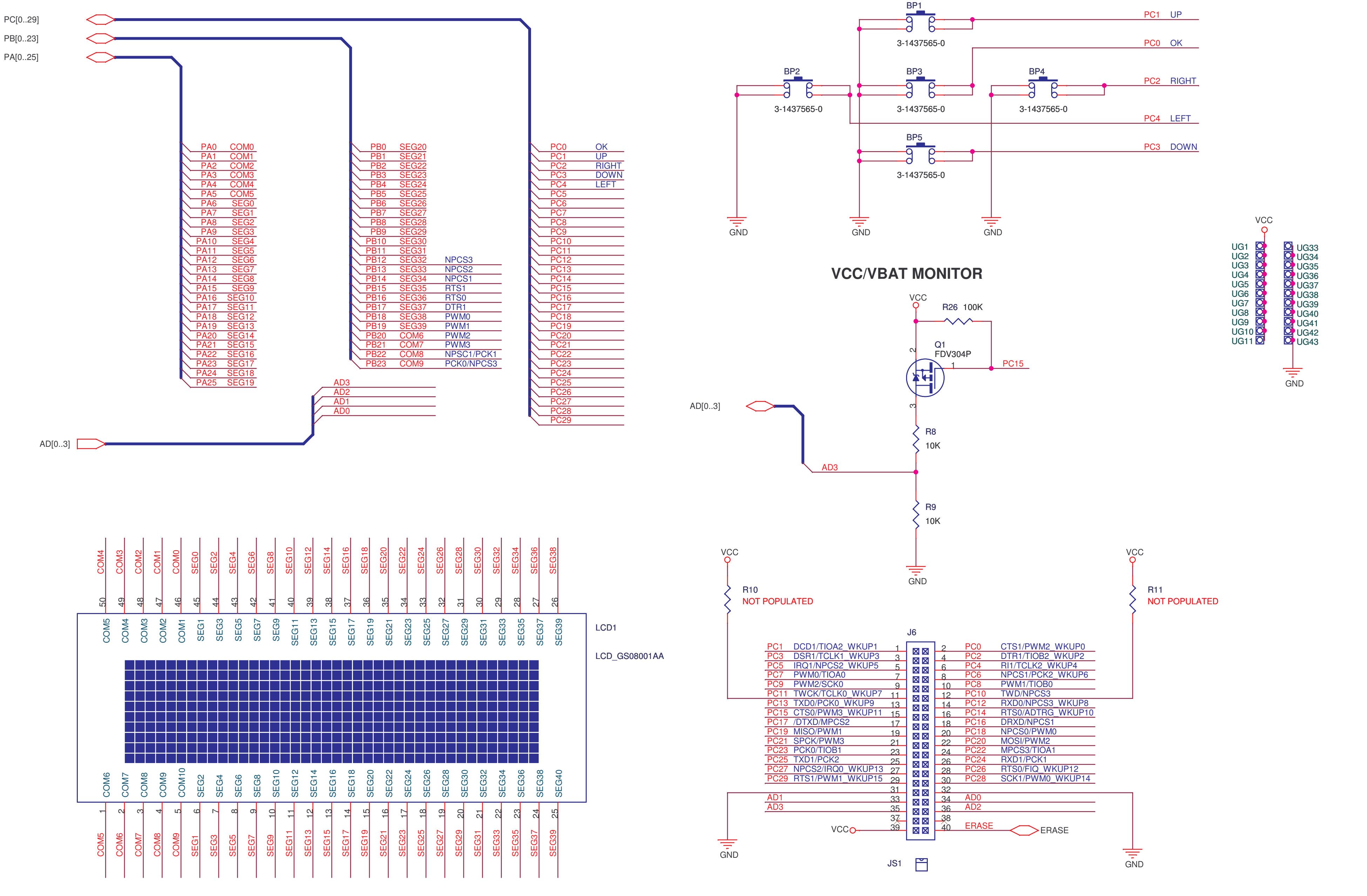
Top level

REV	MODIF.	DES.	DATE	VER.	DATE
B		PP	18-APR-08	LLE	18-APR-08
A	INIT EDIT	PP	17MAR08	XXX	XX-XXX-XX

SCALE 1/1 — REV. B — SHEET 1/4



BATTERY JUMPER
J1
J2 Pad
J3 Pad
J9
JS3
AAA
AAA
VCC
GND
SERIAL DEBUG PORT
U1
MAX3318E
J4
D09P24A4GX00
TP1 TESTPOINT
TP2 TESTPOINT
R5 0R
C1 100NF
C2 100NF
C3 100NF
C4 100NF
C5 100NF
R1 NOT POPULATED
R2 NOT POPULATED
R3 NOT POPULATED
R4 NOT POPULATED
R25 10M
TX
RX
DTXD
DRXD
PC[0..29]
ZIGBEE INTERFACE
Note: Pin 1 on Zigbee board RZ502 matches pin 2 on this connector
J5
R6 0R
R7 10K
U2
NOT POPULATED
NC7SZ175P6X
U3
NOT POPULATED
NC7SZ125P5X
C6 NOT POPULATED
C7 NOT POPULATED
Only for AT86RF230Rev.A connexion
not required for Rev.B on
ATMEL
ROUSSET
AT91SAM7L-STK
Interfaces
SCALE 1/1
REV. B
SHEET 2/4
B PP 18-APR-08 LLE 18-APR-08
A INIT EDIT PP 17MAR08 XXX XX-XXX-XX
REV MODIF. DES. DATE VER. DATE

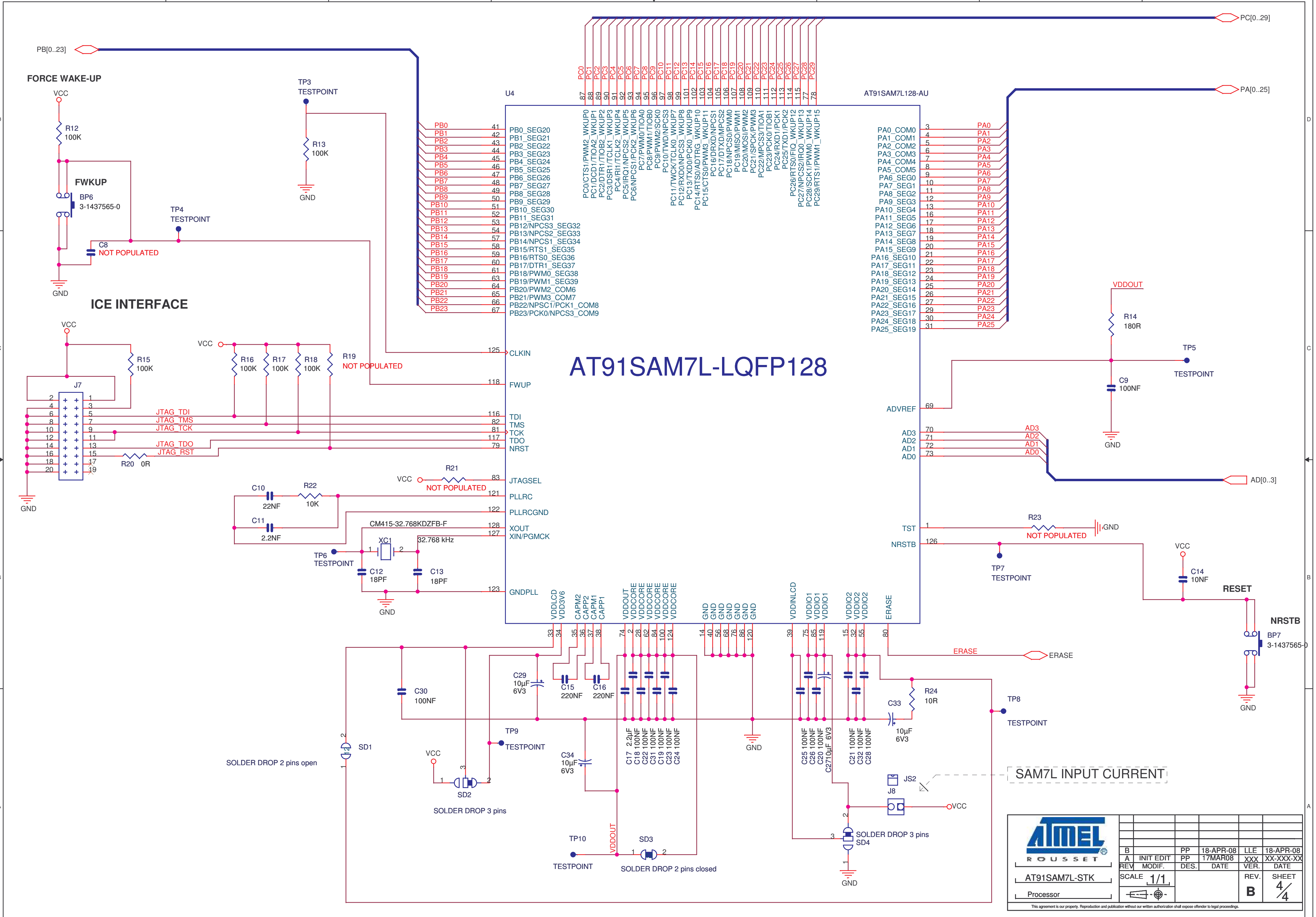


B		PP	18-APR-08	LLE	18-APR-08
A	INIT EDIT	PP	17MAR08	XXX	XX-XXX-XX
REV	MODIF.	DES.	DATE	VER.	DATE

AT91SAM7L-STK

LCD, KBD

SCALE 1/1 — REV. B — SHEET 3/4



PB[0..23]
PC[0..29]
PA[0..25]
AD[0..3]
FORCE WAKE-UP
VCC
R12
100K
FWKUP
BP6
3-1437565-0
C8
NOT POPULATED
TP4
TESTPOINT
GND
TP3
TESTPOINT
R13
100K
ICE INTERFACE
J7
R15
100K
R16
100K
R17
100K
R18
100K
R19
NOT POPULATED
JTAG_TDI
JTAG_TMS
JTAG_TCK
JTAG_TDO
JTAG_RST
R20
0R
U4
AT91SAM7L128-AU
AT91SAM7L-LQFP128
CLKIN
FWUP
TDI
TMS
TCK
TDO
NRST
JTAGSEL
PLLRC
PLLRCGND
XOUT
XIN/PGMCK
GNDPLL
R21
NOT POPULATED
C10
22NF
R22
10K
C11
2.2NF
CM415-32.768KDZFB-F
XC1
32.768 kHz
TP6
TESTPOINT
C12
18PF
C13
18PF
ADVREF
AD3
AD2
AD1
AD0
TST
NRSTB
VDDOUT
R14
180R
TP5
TESTPOINT
C9
100NF
R23
NOT POPULATED
TP7
TESTPOINT
C14
10NF
RESET
NRSTB
BP7
3-1437565-0
ERASE
R24
10R
C33
10µF
6V3
TP8
TESTPOINT
C29
10µF
6V3
C30
100NF
C15
220NF
C16
220NF
C34
10µF
6V3
C17 2.2µF
C18 100NF
C22 100NF
C31 100NF
C19 100NF
C23 100NF
C24 100NF
C25 100NF
C26 100NF
C20 100NF
C27 10µF 6V3
C21 100NF
C32 100NF
C28 100NF
SD1
SOLDER DROP 2 pins open
SD2
SOLDER DROP 3 pins
TP9
TESTPOINT
TP10
TESTPOINT
SD3
SOLDER DROP 2 pins closed
JS2
J8
SD4
SOLDER DROP 3 pins
SAM7L INPUT CURRENT
ATMEL
ROUSSET
AT91SAM7L-STK
Processor
B PP 18-APR-08 LLE 18-APR-08
A INIT EDIT PP 17MAR08 XXX XX-XXX-XX
REV MODIF. DES. DATE VER. DATE
SCALE 1/1
REV. B
SHEET 4/4
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Section 7

Revision History

Doc Rev	Comments	Change Request Ref.
6409A	First issue.	

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